

Insomnia during COVID-19 pandemic and lockdown: Prevalence, severity, and associated risk factors in Jeddah, Saudi Arabia

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ABSTRACT

Objectives: Coronavirus disease 2019 (COVID-19) is highly infectious respiratory disease; it was spread globally to plenty of countries which can be effect on peoples sleep pattern and their psychological condition. The purpose of our study is to measure the prevalence of insomnia and its risk factors during the COVID19 pandemic and lockdown in Jeddah city. **Methodology:** Cross-sectional study with number of 395 participants from general Jeddah population in Saudi Arabia, conducted in July 2020. Three validated questionnaires were used: insomnia severity index (ISI), Generalized Anxiety Disorder 7-item (GAD-7), and scale 3-Patient Health Questionnaire (PHQ-9). **Results:** Our sample size is 395, most of the individuals suffer of several days nervous, worrying too much, not being able to control worrying, trouble relaxing, being restless, and feeling afraid as if something awful might happen 55.9%, 43.0%, 40.3%, 40.5%, 37.7% and 35.4%, respectively. Both genders have mild anxiety 48.4%. Scoring for depression in females were mild 18.0% and moderately depression 11.4% while males had mild depression 13.2%. Of all the participants 34.9% and 45.3%, had mild difficulty falling and staying asleep, 31.4% and 25.8% had moderate difficulty, respectively. 31.6% had mild problem waking up too early and 30.6% had moderate problem. **Conclusion:** Insomnia is definitely linked with all variables except educational level. In contrast to depression and anxiety which have association with educational level only. Female scored higher level than males in anxiety, depression and insomnia.

Keywords: Insomnia COVID-19, Pandemic, Lockdown, Prevalence, Psychological distress



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1. INTRODUCTION

Coronavirus disease 2019 (COVID-19), known as severe acute respiratory syndrome corona-virus 2 (SARS-CoV-2), is a respiratory disease that was detected in December 2019 Wuhan China. It is a highly infectious disease, and the most common symptoms include fever, fatigue, dry cough, dyspnea and myalgia (Ahmed et al., 2020). Symptoms begin after the incubation period which is around 5.2 days of transmission of the infection through human to human, direct contact or droplets route (Bastien et al., 2001). This outbreak spread globally to affect more than 140 countries (Bäuerle et al., 2020). The exponential growth of affected individuals led World Health Organization (WHO) to announce COVID-19 as a global pandemic (Berghiche et al., 2020). As a preventive measure lockdown were announced in most countries worldwide. The purpose is to decrease human contact in public to limit spread of the virus, due to lockdowns stress and health-related fears became overwhelming (Cénat et al., 2020; Choi, 2020).

Previous epidemics had shown beside physical health issues there are serious psychological distress, fear of death, bereavement of dead relatives due to the virus and anxiety (Fadini et al., 2020) additionally, regular sleep habits/patterns (circadian rhythms) were abruptly disrupted and might develop to insomnia (Cénat et al., 2020). A previous study was done in China in 2020 among the general population, with a sample size of 1210, showed that 16.5% have moderate to severe depression symptoms and 28.8% of them have moderate to severe anxiety symptoms and they found about 8.1 had moderate to severe stress symptoms (Gualano et al., 2020).

Previous studies have explored factors associated with the psychiatric issues during Covid-19 pandemic, in china April 17th 2020 with a 33,062 participants were reported on the prevalence of anxiety, depression or insomnia among health care worker (HCW) during Covid-19 pandemic. The results of anxiety, insomnia and depression are over 75% in the majority of the results. A total anxiety prevalence of 24.06%, depression prevalence was calculated 22.8%, insomnia prevalence was calculated as 34.32 % (Huang et al., 2020).

Another cross-sectional study done in Italy, on March 27th and April 6th 2020 after three to four weeks into lockdown measures, with 18147 participants found that Post-Traumatic Stress Symptoms (PTSS), depression, anxiety, insomnia, adjustment disorder and high perceived stress were (37%), (17.3%), (20.8%), (7.3%), (22.9%) and (21.8%) respectively. Females and younger age were correlated to all of the selected outcomes (Killgore et al., 2020). Moreover, a study was done in Riyadh in King Khalid University Hospital between February 5th and 16th in 2020 number of HCW who participated in this study were 582, Majority of them had mild anxiety 397 (68.25%) according to Generalized Anxiety Disorder (GAD-7) scale, followed by moderate anxiety 121(20.8%), while few of them had high moderate 47 (8.1%) and the least of them had severe anxiety 17 (2.9%) (Kokou-Kpolou et al., 2020). Although, several researches have been published in the entire world including insomnia-induced by depression or stress due to the lockdown of COVID-19 outbreak 2020, but still there is lack of studies achieved in Saudi Arabia regarding psychological effects during the COVID-19 lockdown.

This study aims to assess the prevalence, severity, and associated risk factors of insomnia during COVID-19 lockdown in Jeddah Saudi Arabia.

2. METHODS

This study was approved by Dr. Soliman Fakeeh Hospital Scientific Research Review Committee (DSFH IRB) (ethical approval code: 103/IRB/2020). An analytical cross-sectional survey was conducted in Jeddah region of Saudi Arabia, in July 2020. We included all participants aged 18 years and more and we excluded patients who were diagnosed with insomnia, anxiety or depression before the lockdown.

Three validated questionnaires were used: Insomnia Severity Index (ISI) (Bastien et al., 2001), Generalized Anxiety Disorder 7-item (GAD-7) scale (Spitzer et al., 2006) and Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001). Survey sections were as following:

1st section: socio - demographic profile: gender: (male, female), age, marital status (single, married, divorced, widow), occupation (employer, non-employer) educational level (illiterate, read and write, primary school, secondary school, high school, diploma degree, bachelor degree, Master's degree, Doctorate degree), Income during the lockdown from February to July (less than 4000 riyals, 4000-10000 riyal, more than 10000), diagnosed with psychological disease before lockdown, diagnosed with COVID-19.

2nd section: Insomnia Severity Index (ISI) using Likert-type scales. Responses can range from 0 to 4. "No clinically significant insomnia" represents of scoring between (0 - 7), "subthreshold insomnia" (8 - 14), "clinical insomnia (moderate severity)" (15 - 21), and "clinical insomnia (Severe)" (22 - 28).

3rd section: Generalized Anxiety Disorder 7-item (GAD-7) mild, moderate and severe anxiety resembles the turning point of 5, 10 and 15, respectively. 0= Not at all, 1= several days, 2= More than half the days, and 3= nearly every day.

4th section: Patient Health Questionnaire (PHQ-9) not at all=0, several days=1, more than half the days=2, and nearly every day=3) Scores 0-4 non-minimal, 5-9 mild, 10-14 moderate, 15-19 moderately severe and 20-27 severe.

The data collection tool was through an online questionnaire. We entered the data through excel 2013 and all data analysis was performed using SPSS software, version 21. Any significant differences were assessed by frequency, one way anova and chi square test. Data were considered significantly different when $p < 0.05$ and 95% confidence interval.

3. RESULTS

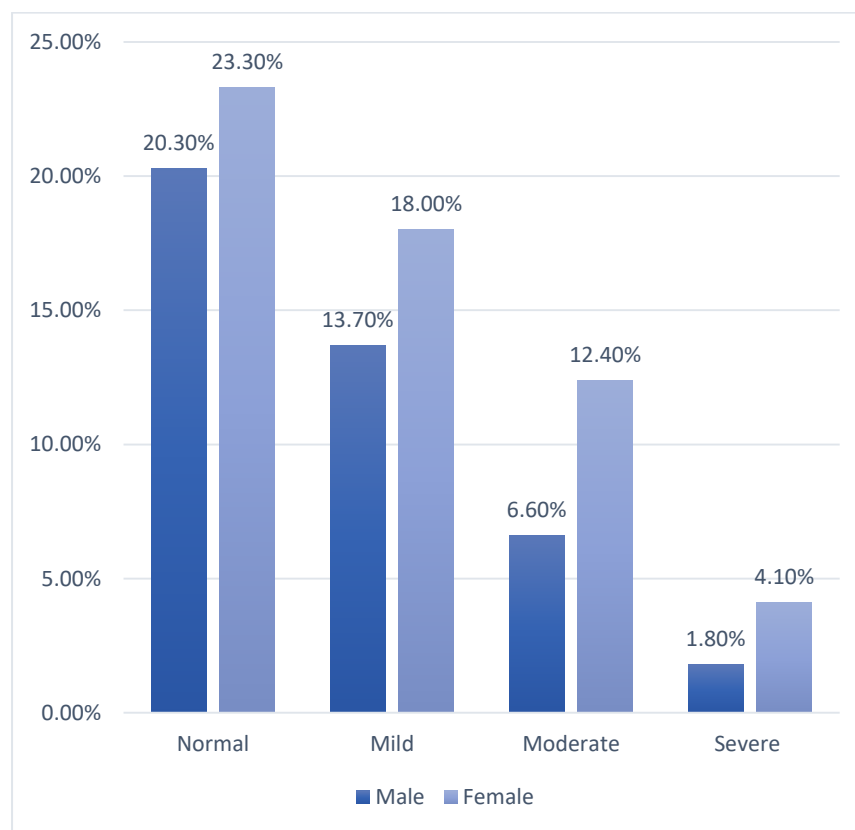
Total participants is 395, the majority were females 228 (57.7%) and 167 (42.3%) were males. The highest percentages of age groups were within 18 to 30 years old (70.1%). For marital status, 238 (60.3%) were single, 146 (37.0%) were married. For the field of work, most of them were non-medical field workers 188 (47.6%). Majority of the participants had a bachelor's degree 293 (74.2%). Most of the participants had a financial income of more than 10000 riyals 157 (39.7%) (Table 1).

Table 1 Sociodemographic data			
Characteristics		N (%)	Total
Gender	Female	228 (57.7%)	395
	Male	167 (42.3%)	
Age Groups	18 - 30	277 (70.1%)	
	31 - 50	91 (23.0%)	
	Above 50	27 (6.8%)	
Marital status	Single	238 (60.3%)	
	Married	146 (37.0%)	
	Divorced	10 (2.5%)	
	Widow	1 (0.3%)	
Occupation	Medical field	38 (9.6%)	
	Non-medical field	188 (47.6%)	
	Medical students	72 (18.2%)	
	Non-medical students	97 (24.6%)	
Educational level	High school	93 (23.5%)	
	Bachelor	293 (74.2%)	
	Higher educational level	9 (2.3%)	
Income	Less than 4000 riyals	95 (24.1%)	
	4000-10000 riyals	143 (36.2%)	
	More than 10000 riyals	157 (39.7%)	

Majority of the participants felt for several days nervous, worrying too much , not being able to control worrying, trouble relaxing, being restless, and feeling afraid as if something awful might happen 221(55.9%), 170 (43.0%), 159 (40.3%), 160 (40.5%), 149 (37.7%) and 140 (35.4%), respectively. Both genders have mild anxiety 191 (48.4%) (Table 2 and graph 1).

Table 2 Generalized Anxiety Disorder (GAD-7) scale				
Items	Not at all sure	Several days	Over half of the days	Nearly every day
Feeling nervous, anxious, or on edge	77 (19.5%)	221 (55.9%)	62 (15.7%)	35 (8.9%)
Not being able to stop or control worrying	172 (43.5%)	159 (40.3%)	42 (10.6%)	22(5.6%)
Worrying too much about different things	112 (28.4%)	170 (43.0%)	74 (18.7%)	39 (9.9%)
Trouble relaxing	155 (39.2%)	160 (40.5%)	49 (12.4%)	31 (7.8%)

Being so restless that it's hard to sit still	233 (59.0%)	110 (27.8%)	37 (9.4%)	15 (3.8%)
Becoming easily annoyed or irritable	130 (32.9%)	149 (37.7%)	69 (17.5%)	47 (11.9%)
Feeling afraid as if something awful might happen	183 (46.3%)	140 (35.4%)	40 (10.1%)	32 (8.1%)

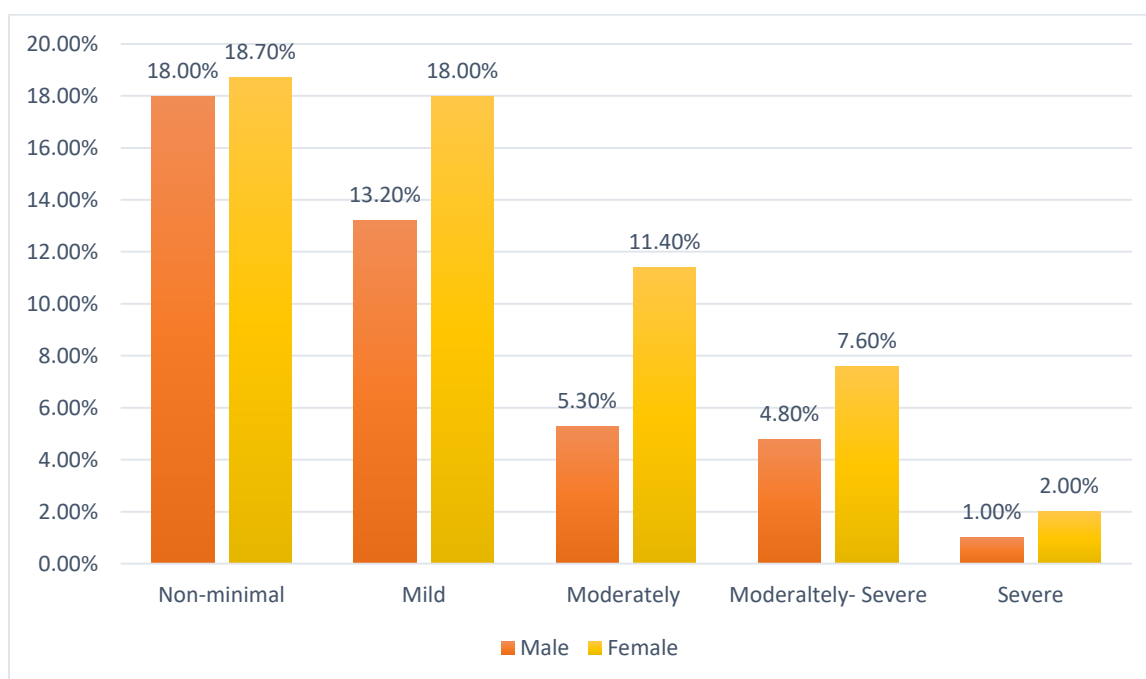


Graph 1 Scoring for Generalized Anxiety Disorder (GAD-7)

Most of the participants 177 (44.8%) had little interest in doing things for several days, 132 (33.4%) Feeling depressed for several days and 42 (10.6%) for more than half of the days. 175 (44.3%) of the participants had trouble either falling, staying, or sleeping too much for several day. The participants have been feeling tired or little energy in several days 168 (42.5%) and 105 (26.6%) in more than half of the days. also they had poor appetite or overeating in several days 132 (33.4%) and 92 (23.3%) in more than half of days. For several days 124 (31.4%) of participants were feeling bad about themselves (Table 3). Scoring for depression in females was mild 71 (18.0%) and moderately depression 45 (11.4%) while males had mild depression 52 (13.2%) (Graph 2).

Table 3 Patient Health Questionnaire (PHQ-9) scale				
Items	Not at all	Several days	More than half of the days	Nearly every day
Little interest or pleasure in doing things	123 (31.1%)	177 (44.8%)	74 (18.7%)	21 (5.3%)
Feeling down, depressed, or hopeless	196 (49.6%)	132 (33.4%)	42 (10.6%)	25(6.3%)
Trouble falling or staying asleep, or sleeping too much	100 (25.3%)	175 (44.3%)	71 (18.0%)	49 (12.4%)

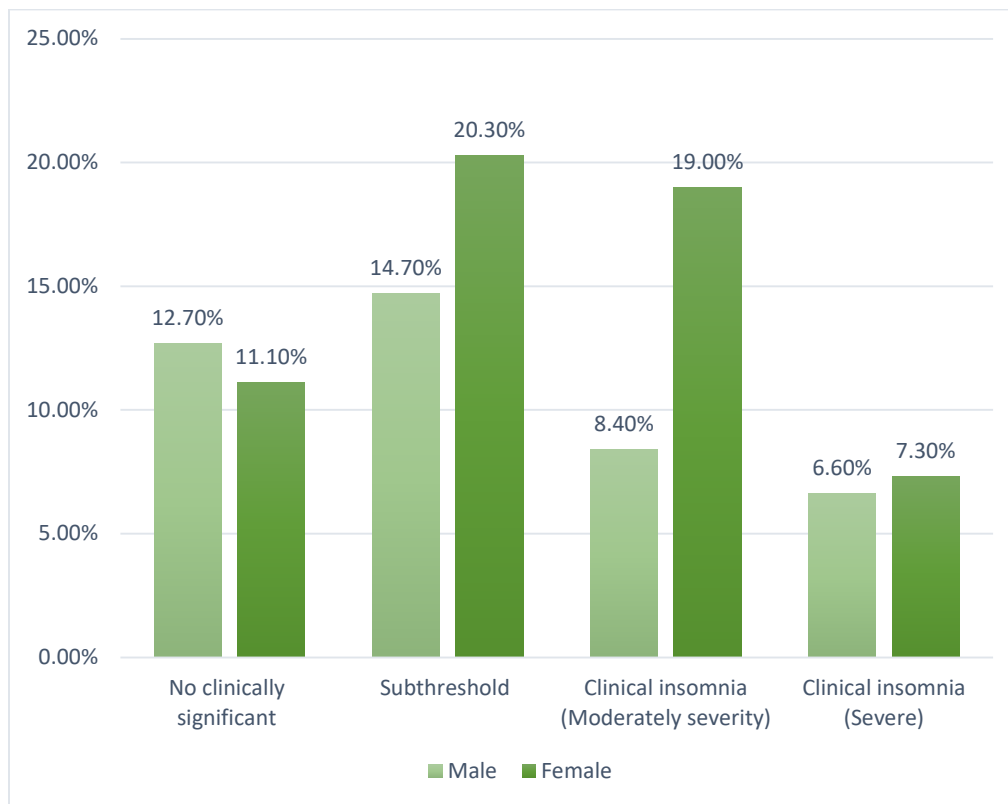
Feeling tired or having little energy	82 (20.8%)	168 (42.5%)	105 (26.6%)	40 (10.1%)
Poor appetite or overeating	130 (32.9%)	132 (33.4%)	92 (23.3%)	41 (10.4%)
Feeling bad about yourself – or that you are a failure or have let yourself or your family down	181 (45.8%)	124 (31.4%)	56 (14.2%)	34 (8.6%)
Trouble concentrating on things, such as reading the newspaper or watching television	193 (48.9%)	118 (29.9%)	52 (13.2%)	32 (8.1%)
Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	273 (69.1%)	82 (20.8%)	22 (5.6%)	18 (4.6%)
Thoughts that you would be better off dead or of hurting yourself in some way	315 (79.7%)	50 (12.7%)	12 (3.0%)	18 (4.6%)



Graph 2 Patient Health Questionnaire (PHQ-9) scale

Of all the participants 138 (34.9%) and 179 (45.3%), had mild difficulty falling and staying asleep, 142 (31.4%) and 102 (25.8%) had moderate difficulty, respectively. 125 (31.6%) had mild problem waking up too early and 121 (30.6%) had moderate problem. 81 (20.5%) of the participants were dissatisfied about their current sleep pattern while 64 (16.2%) were very dissatisfied. Participants who consider that they had sleeping problems that interfere with their daily functions are much interfering 80 (20.3%) and very much interfering 81 (20.5%), Worried/distressed about their sleeping were a little 77 (19.5%) and somewhat 87 (22.0%). Insomnia scoring for females was Subthreshold 80 (20.3%) and clinical moderate insomnia 75 (19.0%) and for males were subthreshold 58 (14.7%) (Table 4 and graph 3).

Table 4 Insomnia Severity Index (ISI)					
Items	None	Mild	Moderate	Severe	Very severe
Difficulty falling a sleep	0 (0.0%)	138 (34.9%)	124 (31.4%)	70 (17.7%)	63 (15.9%)
Difficulty staying a sleep	0 (0.0%)	179 (45.3%)	102 (25.8%)	60 (15.2%)	54 (13.7%)
Problem waking up too early	0 (0.0%)	125 (31.6%)	121 (30.6%)	67 (17.0%)	82 (20.8%)
	Very satisfied	Satisfied	Neutral	dissatisfied	Very dissatisfied
How satisfied/dissatisfied are you with your current sleep pattern?	67 (17.0%)	67 (17.0%)	116 (29.4%)	81 (20.5%)	64 (16.2%)
	Not at all interfering	A little	Somewhat	Much	Very much interfering
To what extent do you consider your sleep problem to interfere with daily functioning (e.g. daytime fatigue, ability to function at work/ daily scores, concentration, memory, mode, etc)	57 (14.4%)	78 (19.7%)	99 (25.1%)	80 (20.3%)	81 (20.5%)
	Not at all noticeable	Barely	Somewhat	Much	Very much noticeable
How noticeable to others do you think your sleeping problem is in terms of impairing the quality of your life?	130 (32.9%)	73 (18.5%)	81 (20.5%)	55 (13.9%)	56 (14.2%)
	Not at all	A little	Somewhat	Much	Very Much
How worried/ distressed are you about your current sleep problem?	147 (37.2%)	77 (19.5%)	87 (22.0%)	45 (11.4%)	39 (9.9%)



Graph 3 Insomnia Severity Index (ISI)

There is a significant relationship between insomnia scoring and all variables except the educational level, which is significant with anxiety and depression symptoms (Table 5).

Table 5 P values			
	P value		
Characteristics	Anxiety scoring	Depression scoring	Insomnia scoring
Gender	0.124	0.18	0.011
Age Groups	0.47	0.25	0.0001
Marital status	0.75	0.17	0.0001
Occupation	0.26	0.37	0.005
Educational level	0.0001	0.0001	0.68
Income	0.30	0.89	0.002

4. DISCUSSION

Our study aim to assess the prevalence, severity, and risk factors of insomnia during the COVID19 lockdown in Jeddah, Saudi Arabia.

Anxiety

This study shows a high anxiety prevalence in our participants (31.6%) and (19.0%) reported mild and moderate anxiety, respectively. Our results are in line with previous findings conducted in Germany where it reported that (28.1%) and (9.8%) mild and moderate anxiety, respectively (Moghanibashi-Mansourieh et al., 2020). In addition, conducted in Iran found that (10.5%) and (21.3%) reported also mild and moderate anxiety, respectively. (Pappa et al., 2020) Other conducted study in China shows prevalence rates of anxiety and depression approximately 8.3% and 14.6%, respectively (Lei et al., 2020).

Depression

This study presents the results of prevalence of depression, participants in our study suffer from mild depression 123 (31.1%) and moderate 66 (16.7%) females in general represent the highest percentage in depression score. A similar study was done in China showed a high prevalence of depression during COVID-19 whereas (16.5%) were expressed moderate to severe depressive symptoms (Gualano et al., 2020). Another study conducted in China reported that (29.0%) mild (12.8%) moderate depression symptoms (Rossi et al., 2020). A study done in Italy, the majority of the participants had average depression symptoms (67.3%) (Rothan et al., 2020). In United State, a study was conducted on young adults during the pandemic of COVID-19 had shown 43.3% of the sample had high levels of depression (PHQ-8 scores ≥ 10) (Shi et al., 2020). A study was performed in India has shown one-fourth of the participants were depressed (Spitzer et al., 2020). Another study done in China, has shown that more than one-third respondents (37.1 %) were having different forms of depression (mild 10.2 %, moderate 17.8 %, and severe 9.1) (WHO et al., 2020).

Insomnia

About insomnia scoring, most of the participants have sleep problems, 138 (34.9%) have subthreshold insomnia, 108 (27.3%) have clinical insomnia, and 55 (13.9%) have severe clinical insomnia which is in line with the a study conducted in the United States (30.9%) scoring in sub-threshold insomnia, (19.8%) scoring in the moderate range insomnia, and 5.2% scoring in the severe insomnia range (Temsah et al. 2020). Also an Italian study had (62.7%) subthreshold (16.3%) moderate (Verma et al., 2020). In addition Chinese study reported that 3256 participants [5.7%] had moderate-to-severe insomnia) (Voitsidis et al., 2020). A study done in Greek found that 37.6% from 2,427 of participants scored above the cut-off for insomnia. The percentage in this study is exceeding the international insomnia prevalence, estimated before the pandemic (Wang et al., 2020). Also in French study (19.1%) from 556 of participants had severe clinical insomnia (Choi et al., 2020). As well, in our study there are significant associations of insomnia with gender, age groups, marital status, occupation and income.

We believe that higher prevalence of anxiety, depression, and insomnia may be explained through two pathways. First, the pandemic itself may be increasing anxiety, depression, and reducing mental well being that may result from worrying on the condition personally, loved one or friend being affected and diagnosed with COVID-19. Moreover, an increase in cases and mortality rates are likely to be further poorly influencing the respondents reported mental health. Second, isolation or social distancing is likely to have negatively impact on mental well-being and increase anxiety and depression, as has been suggested in a previous literature (Fadini et al., 2020).

5. CONCLUSION

There are significant relations between insomnia and all the variables except educational level, However anxiety and depression have significant relation with educational level only. Similar findings were found for insomnia comparing to United States and Italy. Female tend to have higher scoring than males in anxiety, depression and insomnia. We recommend collecting the data from all of Saudi Arabia also targeting psychiatric and chronic disease patient

Author contribution

All authors are qualified for authorship and we have checked the article for plagiarism, all authors were participated in all parts of the study; from the beginning to the end from getting ethical approval until the study be published. Which mean all authors were participate in making study design, data collection, data interpretation and writing all parts of the study. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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Conflict of Interest

The authors declare that there are no conflicts of interests.

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Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Afshar ZM, Ebrahimpour S, Javanian M, Koppolu V, Vasigala VK, Hasanpour AH, Babazadeh A. Coronavirus disease 2019 (COVID-19), MERS and SARS: Similarity and difference. *J Acute Dis* 2020; 9(5):194.
2. Ahmed MZ, Ahmed O, Aibao Z, Hanbin S, Siyu L, Ahmad A. Epidemic of COVID-19 in China and associated psychological problems. *Asian J Psychiatr* 2020; 51:102092.
3. Ahmed MZ, Ahmed O, Aibao Z, Hanbin S, Siyu L, Ahmad A. Epidemic of COVID-19 in China and associated psychological problems. *Asian J Psychiatr* 2020; 51:102092.
4. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Med* 2001; 2(4):297-307.
5. Bäuerle A, Teufel M, Musche V, Weismüller B, Kohler H, Hetkamp M, Dörrie N, Schweda A, Skoda EM. Increased generalized anxiety, depression and distress during the COVID-19 pandemic: a cross-sectional study in Germany. *Int J Public Health* 2020; 42(4):672-8.
6. Berghiche A. COVID-19 and avian corona viruses: epidemiological comparison and genetic approach. *Am J Biomed Sci* 2020; 10(3):21-8.
7. Cénat JM, Felix N, Blais-Rochette C, Rousseau C, Bukaka J, Derivois D, Noorishad PG, Birangui JP. Prevalence of mental health problems in populations affected by Ebola virus disease: a systematic review and meta-analysis. *Psychiatry Res* 2020; 113033.
8. Choi EP, Hui BP, Wan EY. Depression and anxiety in Hong Kong during COVID-19. *Int J Environ Res Public Health* 2020; 17(10):3740.
9. Fadini GP, Morieri ML, Longato E, Bonora BM, Pinelli S, Selmin E, Voltan G, Falaguasta D, Tresso S, Costantini G, Sparacino G. Exposure to dipeptidyl-peptidase-4 inhibitors and COVID-19 among people with type 2 diabetes: A case-control study. *DOM* 2020; 22(10):1946-50.
10. Gualano MR, Lo Moro G, Voglino G, Bert F, Siliquini R. Effects of Covid-19 lockdown on mental health and sleep disturbances in Italy. *Int J Environ Res Public Health* 2020; 17(13):4779.
11. Killgore WD, Cloonan SA, Taylor EC, Fernandez F, Grandner MA, Dailey NS. Suicidal ideation during the COVID-19 pandemic: The role of insomnia. *Psychiatry Res* 2020; 290:113134.
12. Kokou-Kpolou CK, Megalakaki O, Laimou D, Kousouri M. Insomnia during COVID-19 pandemic and lockdown: Prevalence, severity, and associated risk factors in French population. *Psychiatry Res* 2020; 290:113128.
13. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001; 16(9):606-13.
14. Lei L, Huang X, Zhang S, Yang J, Yang L, Xu M. Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. *Med Sci Mon Int Med J Exp Clin Res* 2020; 26:e924609-1.
15. Liu CH, Zhang E, Wong GT, Hyun S. Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for US young adult mental health. *Psychiatry Res* 2020; 290:113172.
16. Mazza C, Ricci E, Biondi S, Colasanti M, Ferracuti S, Napoli C, Roma P. A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: immediate psychological responses and associated factors. *Int J Environ Res Public Health* 2020; 17(9):3165.
17. Moghanibashi-Mansourieh A. Assessing the anxiety level of Iranian general population during COVID-19 outbreak. *Asian J Psychiatr* 2020; 51:102076.
18. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun* 2020.
19. Rossi R, Socci V, Talevi D, Mensi S, Ntoliu C, Pacitti F, Di Marco A, Rossi A, Siracusano A, Di Lorenzo G. COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. *Front Psychiatry* 2020; 11:790.
20. Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J Autoimmun* 2020; 109:102433.
21. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006; 166(10):1092-7.
22. Temsah MH, Al-Sohime F, Alamro N, Al-Eyadhy A, Al-Hasan K, Jamal A, Al-Maghlouth I, Aljamaan F, Al Amri M, Barry M, Al-Subaie S. The psychological impact of COVID-19 pandemic on health care workers in a MERS-CoV endemic country. *J Infect Public Health* 2020; 13(6):877-82.
23. Verma S, Mishra A. Depression, anxiety, and stress and socio-demographic correlates among general Indian public during COVID-19. *Int J Soc Psychiatry* 2020; 66(8):756-62.

24. Voitsidis P, Gliatas I, Bairachtari V, Papadopoulou K, Papageorgiou G, Parlapani E, Syngelakis M, Holeva V, Diakogiannis I. Insomnia during the COVID-19 pandemic in a Greek population. *Psychiatry Res* 2020; 289:113076.
25. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health* 2020; 17(5):1729.
26. Wang Y, Kala MP, Jafar TH. Factors associated with psychological distress during the coronavirus disease 2019 (COVID-19) pandemic on the predominantly general population: A systematic review and meta-analysis. *PLoS One* 2020; 15(12):e0244630.